

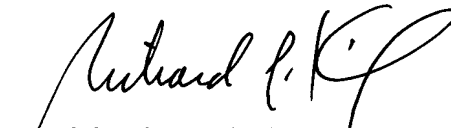
REMARKS

This Preliminary Amendment is to clarify portions of the Application, including the Specification and Claims, to add a new Claim and a new Abstract of the Disclosure, and to amend the Drawings. Also included is a Substituted Specification and a marked-up copy of the Substitute Specification showing the changes made. The Application is an English-translation of the German Application No. 103 61 520.2 filed on December 23, 2003. No new matter has been added.

The Application is now in condition for allowance, and such is respectfully requested.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Barnes & Thornburg LLP, Deposit Account No. 02-1010 (677/44950).

Respectfully submitted,



Richard P. Krinsky
Reg. No. 47,720
(202) 289-1313
BARNES & THORNBURG LLP
Suite 900
750 17th Street, N.W.
Washington, DC 20006-4607

Enclosures
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WO 2005/065835 ————— PCT/EP2004/012319 —————

**METHOD AND DEVICE FOR PREVENTING BLOCKAGES IN THE FLOW PATHS OF
A SEPARATOR****BACKGROUND AND SUMMARY**

[00001] The ~~invention~~ present disclosure relates to a method of preventing blockages of the flow paths and flow pipes of a separator when processing a fat-containing initial product ~~and~~. The present disclosure also relates to a device for implementing the method.

[00002] In numerous food-processing enterprises, separators are used for many different applications and performance spectrums. The separators generally have to be adapted to these different requirements with respect to their construction and design. Although, as a result, they can be used within the predefined task field or process, they react sensitively and often as disturbances to performance changes or changes of the composition of the products to be processed.

[00003] With respect to the sterilization of whey, it is known from German Patent Document DE 100 36 085 to separate the raw whey into cream whey, skimmed whey or ~~[[{]]skimmed milk[[{]]]~~, and solids, ~~[[{]]sediment with germs[[{]]]~~, constituents. ~~In the case,~~ the ~~A~~ centrifugal separation in the separator takes place such that the fat content in the cream whey amounts to more than 45%. The skimmed milk is sterilized and is then returned into the cream whey, which was subjected to no further sterilization, and the cream/skimmed milk mixture ~~forming forms~~ when the skimmed milk is returned to the cream is pasteurized. A high-temperature heating ~~to~~ up to 135°C is not necessary ~~by means of~~ when using this method.

[00004] From German Patent Document DE 198 07 294, a skimming station is known which has a clarification separator and a skimming separator connected to the output side of the clarification separator, ~~a~~. A recirculation pipe for skimmed whey—~~thus,~~ for the portion with the reduced fat content, ~~—leading~~ leads from the outlet of the skimming separator to the inlet of the clarification separator, as ~~[[{]]a bypass piping[[{]]]~~, in order to minimize the loss of fat and improve the quality of the obtained cheese powder.

[00005] German Patent Document DE 198 20 870 suggests that, during the skimming of the whey by ~~means of~~ a separator, a partial quantity of from 0.5 to 2% of the outflowing

wh¹ey cream, ~~—thus of~~ the portion containing more fat, ~~—be¹s~~ returned into the raw wh¹ey fed to the separator~~[[,]]~~ in order to improve the quality of the product.

[00006] During the separation of milk into skimmed milk and cream by ~~means of~~ separators, blockages of the drum, that is, a clogging of at least one portion of the flow paths or of all flow paths of the separator, may occur because of an excessive fat concentration in the cream wh¹ey. Generally, the buttered-out cream clogs the distributor space and/or the disks and/or the cream outlet in the center of the drum and/or the cream discharge connected behind the separator.

[00007] If this blockage occurs, the clogging of the flow paths in the separator, ~~—these are~~ the internal flow pipes and flow paths as well as the discharges leading away from the separator, ~~—according to as is known from~~ the state of the art, can be unclogged only by a hot-water feeding ~~by way of via~~ the inlet and a simultaneous throttling of the skimmed milk outflow or an increase of the inflow output, which leads to product losses and thus to disadvantages with respect to cost.

[00008] With respect to the state of the art, reference is also made to German Patent Documents DE 101 35 073 C2, DE 36 01 814 C2, U.S. Patent Document 27 17 119, German Patent Document 100 36 085 C1, European Patent Document EP 0 427 750 B1, German Patent Document DE 44 07 061 C2 and German Patent Document DE 200 10 743 U1.

[00009] ~~Based on this background, the invention first has the object of providing~~The present disclosure relates to a method by which a threatening clogging of the flow paths can be detected early and can be prevented.

[00010] ~~The invention accomplishes this task by means of the object of Claim 1~~present disclosure thus relates to a method of preventing blockages of flow paths of a separator, the separator processing a fat-containing product such as milk. The method steps include: determining a concentration of the fat content of an outflowing product phase from the separator to detect an imminent clogging; and, shifting a separation zone in a separator drum of the separator for a defined minimum time period by changing operating parameters when a defined fat content limit value is either reached or exceeded.

~~[00011] Advantageous embodiments are contained in the subclaims.~~

~~12~~[00011] ~~According to Claim 1~~Accordingly, the invention first providespresent disclosure relates to a method of preventing a clogging of the flow paths of a separator when processing a fat-containing initial product, particularly such as milk or whey, in the case of which the A concentration of the fat content of an outflowing product phase is determined during the an operation and, when a defined fat-content limit value is reached or exceeded, the a separation zone in the separator drum is shifted for preventing a clogging by means of preferably automatically changing the operating parameters.

~~13~~[00012] In this manner, an imminent clogging can be detected early and can be prevented in a very simple fashion, so that the-rinsing operations, required according to the state of the art, and the resulting losses of product and time are avoided during the production.

~~14~~[00013] Although a method of monitoring, controlling and regulating the operation of a centrifuge is known from German Patent Document DE 101 35 073, according to the method disclosed in this documentof the present disclosure, skimmed milk is removed at the outlet of the centrifuge by means of an analyzer; the A transparency of the skimmed milk sample is then determined and the fat content is determined. As a function of the determined fat content, the adjustment of the centrifuge is monitored, controlled and regulated, particularly and cleaned, for example, periodically. However, the possibility ofThe present disclosure relates to utilizing this automated method for preventing clogging had not been recognized; neither had the possibility ofand counteracting an imminent clogging in the simplest a simple manner by an automatic shifting of the separation zone in the separator drum.

~~15~~[00014] Surprisingly, by using the method of the present disclosure, it also becomesis possible to operate the separator closer to its "limit range"; that is, it becomes possible to carry out a preadjustment of the fat concentration in the cream of up to 44% during the normal operation.

~~16~~[00015] The method is particularly preferred of the present disclosure is utilized when separating cold milk into cream and skimmed milk, the The cold milk of has a temperature of 2-15°C, particularly or, for example, 4-10°C, being and separated into cream having a fat content of from 28-45% and into skimmed milk. During the cold milk separation, particularly the cream phase tends to assume a consistency similar to butter and will then cause a clogging of a least a portion of the flow paths which. Such clogging

can be eliminated only at high expenditures and with a loss of time during the production. ~~In this case, the~~ A closing or clogging occurs as a function of the parameters of the cold milk separation. These parameters include ~~particularly the~~ product temperature, the ~~driven~~ drive capacity and the machine construction, ~~including the disk diameter, the disk thickness, and the cover plate thickness~~[()]. The blockage typically occurs when processing cold milk of a temperature $T = 4^{\circ}\text{C}$, for example, in the case of a fat content of 45% in the cream. This blockage problem ~~can easily and cost-effectively be solved is~~ addressed by means of the invention method of the present disclosure.

~~17~~[00016] ~~According to a first variant~~ an embodiment of the present disclosure, the separation zone in the drum is shifted toward the interior when the limit value is reached or exceeded, specifically, ~~preferably~~ by a throttling of a valve in the skimmed milk outlet. This throttling can take place by ~~means of~~ a timing unit for a given time period.

~~18~~[00017] ~~As an alternative and/or optional~~ embodiment, it is ~~conceivable~~ within the scope of the present disclosure that the blockage of the drum is prevented by increasing the inflow performance. ~~Also by means of this variant, in accordance with embodiment, a~~ “closing” or a clogging of the drum of the separator by a cream having the firm consistency of butter is prevented in a simple manner. In this case, ~~it is advantageous for~~ the inflow rate ~~to may~~ be increased within a time period of 5-60 seconds, ~~particularly or, for example, 5-20 seconds.~~ Even such a short change of the operating parameters can effectively prevent the clogging. This particularly applies when the inflow rate is increased by 5 – 40%, ~~particularly or, for example, 5 – 20%.~~

~~19~~[00018] ~~In principle, different~~ Different measuring methods are ~~conceivable~~ possible for determining the fat content. Thus, the determination of the fat content can take place by ~~means of~~ a mass flow meter, ~~particularly such as~~ with a separate density output. Such measuring devices are offered, for example, by Micro Motion Company.

~~20~~[00019] ~~The invention~~ present disclosure ~~also provides~~ relates to a device for implementing the embodiments of the method according to the invention, which present disclosure. Such a device has a measuring and control device designed ~~for detecting to detect~~ an imminent clogging by ~~means of~~ a determination of the concentration of the fat content of an outflowing product phase and ~~for changing to change~~ the operating parameters when a given fat content limit value is reached or exceeded, ~~particularly.~~ That is done such that a

shifting of the separation zone in the separator drum takes place ~~for preventing to prevent~~ a clogging for a defined minimum time period. Correspondingly, the separator ~~preferably is~~ a cold milk separator which has a inlet for cold milk as well as an outlet for skimmed milk, and a cream outlet, ~~an~~. An analyzer being is arranged in the cream outlet, by means of which the cream concentration, ~~[[—]] that is,~~ the fat content of the cream, ~~[[—]]~~ can be determined. According to two ~~particularly simple variants, which can be implemented in an uncomplicated manner~~ embodiments of the device, the analyzer is connected either with a control input of a control valve in the skimmed milk outlet or with a device for controlling the inflow quantity of cold milk into the separator.

~~[00021] Additional advantageous embodiments are contained in the remaining subclaims.~~

~~22][00020]~~ In the following, the method according to the invention will be described in detail with reference to the drawing. Other aspects of the present disclosure will become apparent from the following descriptions when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

~~23][00021]~~ Figure 1 is a schematic representation of a device for the separation of cold milk, which operates according to the method of the invention; and in accordance with a method of the present disclosure.

~~24][00022]~~ Figure 2 is a schematic representation of a separator for the device of the method of Figure 1.

DETAILED DESCRIPTION

~~25][00023]~~ In a first example an illustrative embodiment, by means of a separator 2 with a vertical axis of rotation R, cold milk KM, which is guided by way of via an inlet 1 into a separator 2 ~~[[ϵ]] or into a separator drum[[γ]] 10, the separator 2 having a drive 3[[ζ]]. The cold milk KM is separated in the separator 2 into the skimmed milk MM and cream RA constituents and is the constituents are discharged from the separator 2 by way of a skimmed milk outlet 4 and a cream outlet 5, respectively.~~

~~26][00024]~~ In the or on the outlet 5 for the cream RA, an analyzer 6 is inserted or mounted by means of which the a cream concentration, ~~[[—]] that is,~~ the fat content of the cream RA, – can be is determined. The analyzer 6 is preferably connected with a control device 19 of

the separator 2 (~~not shown here~~) or is connected directly with a control input of a control valve 7.

~~27~~[00025] _____ When a defined limit value of ~~a~~the fat content of, for example, 43% in the cream RA₂ is exceeded on the analyzer 6, the control valve 7 in the skimmed milk outlet 4 is closed into a defined position.

~~28~~[00026] _____ This ~~adjusted~~That value ~~preferably~~ corresponds to an outflow pressure of 0.5% bar below ~~the~~an overflow limit of the separator 2. In this ~~illustrative embodiment of the method~~, a variably adjustable timer or time unit is running simultaneously, which holds the control valve 7 in the above-mentioned position.

~~29~~[00027] _____ As a result of ~~the~~a fast closing of the control valve 7, ~~the~~a separation zone 20 in the separator 2 or the separator drum 10 is shifted toward an interior. Simultaneously, ~~the~~ a resulting pressure increase on the skimmed milk outlet 4 pushes the cream RA away from ~~the~~a center of the drum 10.

~~30~~[00028] _____ After the timer or the time unit has run out, the control valve 7 in the skimmed milk outlet 4 returns into a position which corresponds to ~~the~~a defined cream fat content of, for example, 40%.

~~31~~[00029] _____ As a result of ~~the~~a controlling by way of the skimmed milk outflow in connection with the defined limit value against a blocking or clogging of the drum 10, the following parameters can be ~~compensated~~addressed:

- an increased cream fat content in the inflow,
- a temperature reduction and
- an inflow rate reduction.

~~32~~[00030] _____ ~~A corresponding constructive~~ An embodiment of the drum 10 and a gripper construction of a cold milk separator 2 is ~~advantageous for a perfect operation~~. ~~A corresponding embodiment is illustrated in Figure 2.~~

~~33~~[00031] _____ The separator ~~illustrated here~~2 is used for the cold-milk separation. Its ~~inlet~~Inlet 1 for the cold milk KM leads from below through a screw 8 and a distributor 9 into the separator drum 10, in which a disk stack 11 is arranged and which has a separating disk 12.

~~34~~[00032] _____ In a ~~first example~~an illustrative embodiment, by ~~means of~~a separator 2, cold milk KM, which is guided ~~by way of an~~via inlet 1 into a separator 2 having ~~a~~drive 3, is

separated in the separator 2 into the skimmed milk MM and cream RA constituents, and is the constituents are discharged from the separator 2 by way of outlets 4 and 5, respectively.

35][00033] _____ In ~~the~~ or on the outlet 5 for the cream RA, an analyzer 6 is inserted or mounted by ~~means of which the cream concentration, [[-]]that is, the fat content of the cream RA, – can be~~ is determined. The analyzer 6 is ~~preferably connected with a the~~ control device 19 of the separator 2 (~~not shown here~~) or is connected directly with a control input of a control valve 7.

36][00034] _____ A swirl space 13 in a discharge 16 for skimmed milk MM on a separating disk 12, and a regulating disk 14 with a relatively large diameter in comparison to ~~the an~~ overflow diameter in ~~the a~~ gripper chamber cover 15 in the skimmed milk outlet 4, have an advantageous effect, ~~particularly in order to permit by permitting a~~ preadjustment of the a cream concentration of approximately 44% and a throttling of ~~the a~~ skimmed milk outflow pressure.

37][00035] _____ ~~Furthermore, aA~~ corresponding drum 10 construction ~~ensures makes possible a~~ large bandwidth for controlling the skimmed milk outflow pressure.

38][00036] _____ A centripetal pump 17 is used for discharging the skimmed milk MM and a centric collecting pipe 18 in the axis of rotation R is used for discharging the cream RA.

39][00037] _____ The larger the diameter difference between the regulating disk 14 and ~~the~~ overflow edge ~~45~~ on the gripper cover 15, the more the separation zone 20 can be changed by a sudden closing of the skimmed milk control valve 4 and the cream RA can be pushed out with more pressure.

40][00038] _____ In another embodiment of ~~the a~~ control and of ~~the a~~ method for preventing a clogging of the separator drum 10 in ~~the a~~ manner of an antilock system, ~~the an~~ “antilock control” takes place by ~~way of an increase of the inflow rate of the cold milk KM and the a~~ resulting pushing-out of the cream RA.

41][00039] _____ When the limit value of a cream fat content of 43% is exceeded, the inflow rate is, for example, abruptly increased by at least 5,000 l/h. As a result, the cream RA is diluted by approximately 10% and, as a result of ~~the a~~ liquid level shift in the drum 10, the cream RA is, in turn, pushed out of the drum 10.

~~42~~[00040] ~~In the case of this~~ According to the method of operation the present disclosure, the an operation can again take place with a previously fixedly adjusted cream concentration of, for example, 40%. The adjustment of the cream concentration preferably takes place by way of the regulating disk 14, thus which is independently independent of the skimmed milk outflow pressure purely by way of via the inflow rate.

[00041] A controlling ~~by way of via~~ the inflow rate is permissible particularly when processing cold milk KM[[,]] when no plate apparatus is present which would have to be operated at a constant rate. In this fashion, a regulating ~~by way of~~ a cream outflow control can be saved. The throttling of the cream quantity is no longer necessary.

[00042] Although the present disclosure has been described and illustrated in detail, it is to be clearly understood that this is done by way of illustration and example only and is not to be taken by way of limitation. The scope of the present disclosure is to be limited only by the terms of the appended claims.

List of Reference Symbols

Cold milk	KM
Skimmed milk	MM
Cream	RA
Inlet	1
Separator	2
Drive	3
Outlets	4 and 5
Analyzer	6
Control valve	7
Screw	8
Distributor	9
Separator drum	10
Disk stack	11
Separating disk	12
Swirl space	13
Regulating disk	14
Gripper chamber cover	15
Discharge	16
Centripetal	17
Collecting pipe	18